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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/590,621 06/08/00 AKRAM

S 3936US (99-0

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MM91/1003

EXAMINER

REFE7NY.N

ART UNIT

PAPER NUMBER

2813

DATE MAILED:

10/03/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/590,621

Applicant(s)

AKRAM ET AL.

Examiner

Nema O Berezny

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 August 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) 24-35 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 and 36-40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 11 April 2001 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2,5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of claims 1-23 and 36-40 in Paper No. 7 is acknowledged.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 20, 22, and 36 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The preambles and other relevant information are missing from the beginning of said amended claims. For examination purposes, the preambles from said unamended (original) claims were used.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5, 8, 10, 13-16, 36, and 40 are rejected under 35 U.S.C. 102(b) as being anticipated by Kuniaki (JP10189653). Kuniaki discloses forming a flip chip

semiconductor die (Fig.1 el.3) having an active surface (el.4a); and forming a plurality of stabilizers (el.12) to protrude from said active surface at a height substantially consistent to a die-to-substrate distance (Fig.2), located at the four corners of said active surface (Fig.1), and configured to at least partially stabilize an orientation of said flip chip die when disposed face down over a higher level substrate (abstract – lines 1-4, 25-29). Kuniaki also discloses providing a sealing material (el.10a-d) on said active surface to secure said stabilizers to said sealing material (abstract – lines 26-29), wherein it is implied that said sealing material adheres said stabilizers to said active surface. Kuniaki also discloses forming solder bumps (el.11) on bond pads (el.7) of said flip chip die, bonding said solder bumps to corresponding contacts (Fig.2 el.14) of said substrate (el.2), forming an encapsulant material (el.5) between said flip chip die and said substrate, and positioning said stabilizers so as to avoid contact with said conductive traces on said substrate (Fig.2).

Claim 19 is rejected under 35 U.S.C. 102(b) as being anticipated by Farnworth (5,484,314). Farnworth discloses placing a substrate (Fig.1 el.11) with contact pads (el.15) in a horizontal plane; and stereolithographically forming stabilizers (el.18) of a semisolid material between said contact pads and an edge of said substrate (col.3 lines 50-57; col.4 lines 29-36), wherein a location and orientation of said substrate is recognized (col.4 lines 22-28).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6-7, 11, 18, and 37-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuniaki as applied to claims 1-5, 8, 10, 13-16, and 36 above, and further in view of Farnworth (5,484,314). Kuniaki does not disclose forming a stabilizer from photoimageable material or patterned insulative material or as at least two superimposed adhered layers of material, or forming said stabilizers to have a height less than or greater than a minimum distance of said conductive structures. However, Farnworth discloses forming said stabilizer from a photoimageable or patterned insulative material comprised of at least two superimposed adhered layers of material, wherein said stabilizers are formed to have a height less than or greater than a minimum distance of said protruding conductive structures (col.4 lines 15-28, 34-45). Therefore, it would have been obvious to a person skilled in the art at the time of the invention to use the photoimageable and multiple layered stabilizers of Farnworth with the method of forming a flip chip die of Kuniaki in order to program and therefore, customize the size, shape, and placement of said stabilizers repeatedly, accurately, and efficiently (Farnworth – col.4 lines 29-33).

Examiner takes Official Notice that lengthening said conductive structures during bonding is conventionally practiced in the semiconductor industry, and would have been obvious to a person skilled in the art at the time of the invention. Bonding two conductive structures together by using a third conductive reflowed material will inherently lengthen the existing two conductive structures. Said bonding could advantageously be used when the third material has a lower melting point than either of the two structures, and therefore bonding can occur at a lower temperature.

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kuniaki as applied to claims 1-5, 8, 10, and 13-16 above, and further in view of Liang et al. (5,639,696). Kuniaki does not disclose a disposing conductive structures comprising conductive pillars. However, Liang discloses forming a flip chip package wherein the conductive structures which connect the die to the substrate comprise conductive pillars (Fig.4 el.52). Therefore, it would have been obvious to a person skilled in the art at the time of the invention to use the conductive pillars of Liang with the method of forming a flip chip die of Kuniaki in order to form a larger distance between the die and the substrate.

Claims 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farnworth as applied to claim 19 above, and further in view of Migdal et al. (5,870,220). Farnworth does not disclose storing data in computer memory and using said stored data in conjunction with a machine vision system to form said stabilizers. However,

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Migdal discloses a combined system of stereolithography and machine vision, which can quickly and accurately scan an object, store data from said scan, and manipulate said object based upon programmed instructions (col.3 line 59 – col.4 line 17). It is implied that said system would be capable of including at least one parameter of another device component in computer memory. Therefore, it would have been obvious to a person skilled in the art at the time of the invention to use the stereolithography and machine vision combined system of Migdal with the method of forming a semiconductor device of Farnworth in order to consistently mass produce semiconductor devices with stabilizers quickly and accurately.

Farnworth also discloses securing said substrate to a carrier (Fig.2 el.32).

Claims 9 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuniaki. However, Kuniaki does not disclose providing a semiconductor wafer with a plurality of flip chip dice or applying a layer of photoresist material and patterning said photoresist. Examiner takes Official Notice that wafer fabrication, and applying and patterning a photoresist layer are conventionally practiced in the semiconductor industry for the purposes of mass production of said flip chip dice and for patterning an underlying layer, respectively, and would have been obvious to a person skilled in the art at the time of the invention.

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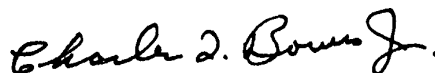
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nema O Berezny whose telephone number is (703) 305-3445. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Bowers, Jr. can be reached on (703) 308-2417. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

NB
September 27, 2001


Charles Bowers
Supervisory Patent Examiner
Technology Center 2800